**CLAIMS**

We claim:

1. A process for removing dimethyl ether from an olefin-containing effluent stream, the process comprising the steps of:

   (a) providing the effluent stream, wherein the effluent stream comprises ethane, ethylene, propane, propylene and dimethyl ether;

   (b) contacting the effluent stream with an oxygenate removal medium in an oxygenate removal unit under conditions effective to form a first overhead stream and a first bottoms stream, wherein the first overhead stream comprises residual oxygenate removal medium and a majority of the ethane, ethylene, propane, propylene, and dimethyl ether, and wherein the first bottoms stream comprises a minority of the dimethyl ether and a majority of the oxygenate removal medium;

   (c) contacting the first overhead stream with water under conditions effective to form a second overhead stream and a second bottoms stream, wherein the second overhead stream comprises a majority of the ethane, ethylene, propane, propylene, and dimethyl ether present in the first overhead stream, and wherein the second bottoms stream comprises a majority of the residual oxygenate removal medium and a majority of the water; and

   (d) separating at least a portion of the second overhead stream into a third overhead stream and a third bottoms stream, wherein the third overhead stream comprises a majority of the propylene and optionally a majority of the ethane, ethylene and light ends present in the at least a portion of the second overhead stream, and wherein the third bottoms stream comprises a majority of the propane and dimethyl ether present in the at least a portion of the second overhead stream.

2. The process of claim 1, wherein the oxygenate-removal medium is selected from the group consisting of methanol and tri(ethylene glycol).

3. The process of claim 1, wherein the second overhead stream contains greater than 1000 wppm dimethyl ether, based on the total weight of the second overhead stream.

4. The process of claim 3, wherein the second overhead stream contains greater than 1500 wppm dimethyl ether, based on the total weight of the second overhead stream.

5. The process of claim 1, wherein the process further comprises the step of:
(e) separating chemical grade or purer propylene from at least a portion of the third overhead stream.

6. The process of claim 5, wherein the chemical grade or purer propylene is polymer grade propylene.

7. The process of claim 6, wherein the process further comprises the step of:
(f) polymerizing the polymer grade propylene.

8. The process of claim 1, wherein the process further comprises the step of:
(e) separating polymerization grade ethylene from at least a portion of the third overhead stream.

9. The process of claim 8, wherein the process further comprises the step of:
(f) polymerizing the polymerization grade ethylene.

10. The process of claim 1, wherein the olefin-containing effluent stream is derived from an oxygenate to olefin reaction system.

11. The process of claim 1, wherein the third bottoms stream comprises at least 1 weight percent dimethyl ether, based on the total weight of the third bottoms stream.

12. The process of claim 11, wherein the third bottoms stream comprises at least 10 weight percent dimethyl ether, based on the total weight of the third bottoms stream.

13. The process of claim 1, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further comprise $C_4$+ hydrocarbons, the process further comprising the step of:

(e) removing at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

14. The process of claim 1, wherein the process further comprises the step of:

(e) removing at least a majority of the ethane from the second overhead stream.

15. The process of claim 1, wherein the process further comprises the step of:

(e) removing at least a majority of the light ends from the second overhead stream.

16. The process of claim 1, wherein the second overhead stream further comprises water, the process further comprising the step of:

(e) contacting at least a portion of the second overhead stream with a drying medium in a drying unit under conditions effective to remove at least a majority of the water from the at least a portion of the second overhead stream.

17. The process of claim 1, wherein the second overhead stream further comprises carbon dioxide, the process further comprising the step of:

(e) contacting at least a portion of the second overhead stream with a caustic medium under conditions effective to remove at least a majority of the carbon dioxide from the at least a portion of the second overhead stream.

18. A process for separating components from an olefin-containing effluent stream, the process comprising the steps of:

(a) providing the effluent stream, wherein the effluent stream comprises ethane, ethylene, propane, propylene and dimethyl ether;

(b) contacting the effluent stream with an oxygenate removal medium in an oxygenate removal unit under conditions effective to form a first overhead stream and a first bottoms stream, wherein the first overhead stream comprises residual oxygenate removal medium and a majority of the ethane, ethylene, propane, propylene, and dimethyl ether, and wherein the first bottoms stream comprises a minority of the dimethyl ether and a majority of the oxygenate removal medium;

(c) contacting the first overhead stream with water under conditions effective to form a second overhead stream and a second bottoms stream, wherein the second overhead stream comprises a majority of the ethane, ethylene, propane, propylene, and dimethyl ether present in the first overhead stream, and wherein the second bottoms stream comprises a majority of the residual oxygenate removal medium present in the first overhead stream and a majority of the water;

(d) separating at least a portion of the second overhead stream into a third overhead stream and a third bottoms stream, wherein the third overhead stream comprises a majority of the ethane and ethylene present in the at least a portion of the second overhead stream, and wherein the third bottoms stream comprises a majority of the propane, propylene and dimethyl ether present in the at least a portion of the second overhead stream; and

(e) separating at least a portion of the third bottoms stream into a fourth overhead stream and a fourth bottoms stream, wherein the fourth overhead stream comprises a majority of the propylene present in the at least a portion of the third bottoms stream, and wherein the fourth bottoms stream comprises a majority of the propane and dimethyl ether present in the at least a portion of the third bottoms stream.

19. The process of claim 18, wherein the oxygenate-removal medium is selected from the group consisting of methanol and tri(ethylene glycol).

20. The process of claim 18, wherein the second overhead stream contains greater than 1000 wppm dimethyl ether, based on the total weight of the second overhead stream.

21. The process of claim 20, wherein the second overhead stream contains greater than 1500 wppm dimethyl ether, based on the total weight of the second overhead stream.

22. The process of claim 18, wherein the process further comprises the step of:

(f) separating at least a portion of the third overhead stream into a fifth overhead stream and a fifth bottoms stream, wherein the fifth overhead stream contains a majority of the ethylene present in the at least a portion of the third overhead stream, and wherein the fifth bottoms stream contains a majority of the ethane present in the at least a portion of the third overhead stream.

23. The process of claim 22, wherein the process further comprises the step of:

(g) polymerizing the ethylene from the fifth overhead stream.

24. The process of claim 18, wherein the process further comprises the step of:

(f) combusting at least a portion of the fourth bottoms stream as fuel.

25. The process of claim 18, wherein the process further comprises the steps of:

(f) feeding an oxygenate into a reactor; and

(g) contacting the oxygenate with a molecular sieve catalyst composition in a reactor under conditions effective to convert at least a portion of the oxygenate to light olefins and optionally byproducts.

26. The process of claim 25, wherein step (g) occurs at an oxygenate conversion of from about 80 to about 99 weight percent, based on the total weight of oxygenate fed to the reactor in step (f).

27. The process of claim 26, wherein step (g) occurs at an oxygenate conversion of from about 93 to about 96 weight percent, based on the total weight of oxygenate fed to the reactor in step (f).

28. The process of claim 18, wherein the fourth bottoms stream comprises at least 1 weight percent dimethyl ether, based on the total weight of the fourth bottoms stream.

29. The process of claim 28, wherein the fourth bottoms stream comprises at least 10 weight percent dimethyl ether, based on the total weight of the fourth bottoms stream.

30. The process of claim 18, wherein the olefin-containing effluent stream, the first overhead stream, the second overhead stream, and the third overhead stream contain acetylene, the process further comprising the step of:

(f) contacting the acetylene in at least a portion of the third overhead stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the acetylene to ethylene.

31. The process of claim 18, wherein the olefin-containing effluent stream, the first overhead stream, the second overhead stream, and the third bottoms stream contain methyl acetylene or propadiene, the process further comprising the step of:

(f) contacting the methyl acetylene or propadiene in at least a portion of the third bottoms stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the methyl acetylene or propadiene to propylene.

32. The process of claim 18, wherein the effluent stream, the first overhead stream, the second overhead stream and the third overhead stream further contain methane, the process further comprising the step of:

(f) separating at least a portion of the third overhead stream into a fifth overhead stream and a fifth bottoms stream, wherein the fifth overhead stream contains a majority of the methane present in the at least a portion of the third overhead stream, and wherein the fifth bottoms stream contains a majority of the ethylene and ethane present in the at least a portion of the second overhead stream.

33. The process of claim 32, wherein the process further comprises the step of:

(g) separating at least a portion of the fifth bottoms stream into a sixth overhead stream and a sixth bottoms stream, wherein the sixth overhead stream contains a majority of the ethylene present in the at least a portion of the fifth bottoms stream, and wherein the sixth bottoms stream contains a majority of the ethane present in the at least a portion of the fifth bottoms stream.

34. The process of claim 32, wherein the olefin-containing effluent stream, the first overhead stream, the second overhead stream, the third overhead stream, and the fifth bottoms stream contain acetylene, the process further comprising the step of:

(g) contacting the acetylene in at least a portion of the fifth bottoms stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the acetylene to ethylene.

35. The process of claim 18, wherein the olefin-containing effluent stream contains from 50 to 95 combined weight percent ethylene and propylene, based on the total weight of the olefin-containing effluent stream.

36. The process of claim 18, wherein the olefin-containing effluent stream contains from 25 to 75 weight percent ethylene, based on the total weight of the olefin-containing effluent stream.

37. The process of claim 18, wherein the olefin-containing effluent stream contains from 25 to 75 weight percent propylene, based on the total weight of the olefin-containing effluent stream.

38. The process of claim 18, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further contain carbon dioxide, the process further comprising the step of:

(f) contacting the second overhead stream with a caustic medium under conditions effective to remove at least a majority of the carbon dioxide from the second overhead stream.

39. The process of claim 38, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further contain $C_4$+ hydrocarbons, the process further comprising the step of:

(g) separating at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

40. The process of claim 18, wherein the second overhead stream further contains water, the process further comprising the step of:

(f) contacting the second overhead stream with a drying medium in a drying unit under conditions effective to remove at least a majority of the water from the second overhead stream.

41. The process of claim 18, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further contain $C_4$+ hydrocarbons, the process further comprising the step of:

(f) separating at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

42. The process of claim 18, wherein the process further comprises the step of:

(f) polymerizing the propylene from the fourth overhead stream.

43. A process for separating components from an olefin-containing effluent stream, the process comprising the steps of:

(a) providing the olefin-containing effluent stream, wherein the effluent stream contains ethane, ethylene, propane, propylene, dimethyl ether and one or more oxygenates, wherein the one or more oxygenates are selected from the group consisting of methyl ethyl ether, ethanol, isopropanol, acetic acid, propionic acid, ethanal, butanal, propanal, acetone, 2-butanone, 2-pentanone, 4-methyl-2-pentanone and methyl acetate;

(b) contacting the effluent stream with an oxygenate removal medium in an oxygenate removal unit under conditions effective to form a first overhead stream and a first bottoms stream, wherein the first overhead stream contains a majority of the ethane, ethylene, propane, propylene, and dimethyl ether present in the effluent stream and residual oxygenate removal medium, and wherein the first bottoms stream contains a majority of the oxygenate removal medium, a majority of the oxygenates present in the effluent stream, and a minority of the dimethyl ether present in the effluent stream;

(c) contacting the first overhead stream with water under conditions effective to form a second overhead stream and a second bottoms stream, wherein the second overhead stream contains a majority of the ethane, ethylene, propane, propylene, and dimethyl ether present in the first overhead stream, and wherein the second bottoms stream contains a majority of the residual oxygenate removal medium present in the first overhead stream and a majority of the water;

(d) separating at least a portion of the second overhead stream into a third overhead stream and a third bottoms stream, wherein the third overhead stream contains a majority of the ethane and ethylene present in the at least a portion of the second overhead stream, and wherein the third

bottoms stream contains a majority of the propane, propylene and dimethyl ether present in the at least a portion of the second overhead stream; and

(e) separating at least a portion of the third bottoms stream into a fourth overhead stream and a fourth bottoms stream, wherein the fourth overhead stream contains a majority of the propylene present in the at least a portion of the third bottoms stream, and wherein the fourth bottoms stream contains a majority of the propane and dimethyl ether present in the at least a portion of the third bottoms stream.

44. The process of claim 43, wherein the oxygenate-removal medium is selected from the group consisting of methanol and tri(ethylene glycol).

45. The process of claim 43, wherein the second overhead stream contains greater than 1000 wppm dimethyl ether, based on the total weight of the second overhead stream.

46. The process of claim 45, wherein the second overhead stream contains greater than 1500 wppm dimethyl ether, based on the total weight of the second overhead stream.

47. The process of claim 43, wherein the process further comprises the step of:

(f) separating at least a portion of the third overhead stream into a fifth overhead stream and a fifth bottoms stream, wherein the fifth overhead stream contains a majority of the ethylene present in the at least a portion of the third overhead stream, and wherein the fifth bottoms stream contains a majority of the ethane present in the at least a portion of the third overhead stream.

48. The process of claim 47, wherein the process further comprises the step of:

(g) polymerizing the ethylene from the fifth overhead stream.

49. The process of claim 43, wherein the process further comprises the step of:
(f) combusting at least a portion of the fourth bottoms stream as fuel.

50. The process of claim 43, wherein the process further comprises the steps of:
(f) feeding methanol into a reactor; and
(g) contacting the methanol with a molecular sieve catalyst composition in a reactor under conditions effective to convert a portion of the methanol to light olefins and, optionally byproducts.

51. The process of claim 50, wherein step (g) occurs at a methanol conversion of from about 80 to about 99 weight percent, based on the total weight of the methanol fed to the reactor in step (f).

52. The process of claim 51, wherein step (g) occurs at a methanol conversion of from about 93 to about 96 weight percent, based on the total weight of the methanol fed to the reactor in step (f).

53. The process of claim 43, wherein the fourth bottoms stream comprises at least 1 weight percent dimethyl ether, based on the total weight of the fourth bottoms stream.

54. The process of claim 53, wherein the fourth bottoms stream comprises at least 10 weight percent dimethyl ether, based on the total weight of the fourth bottoms stream.

55. The process of claim 43, wherein the olefin-containing effluent stream, the first overhead stream, the second overhead stream, and the third overhead stream contain acetylene, the process further comprising the step of:
(f) contacting the acetylene in at least a portion of the third overhead stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the acetylene to ethylene.

56. The process of claim 43, wherein the olefin-containing effluent stream, the first overhead stream, the second overhead stream, and the third bottoms stream contain methyl acetylene or propadiene, the process further comprising the step of:

(f) contacting the methyl acetylene or propadiene in at least a portion of the third bottoms stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the methyl acetylene or propadiene to propylene.

57. The process of claim 43, wherein the effluent stream, the first overhead stream, the second overhead stream and the third overhead stream further contain methane, the process further comprising the step of:

(f) separating at least a portion of the third overhead stream into a fifth overhead stream and a fifth bottoms stream, wherein the fifth overhead stream contains a majority of the methane present in the at least a portion of the third overhead stream, and wherein the fifth bottoms stream contains a majority of the ethylene and ethane present in the at least a portion of the second overhead stream.

58. The process of claim 57, wherein the process further comprises the step of:

(g) separating at least a portion of the fifth bottoms stream into a sixth overhead stream and a sixth bottoms stream, wherein the sixth overhead stream contains a majority of the ethylene present in the at least a portion of the fifth bottoms stream, and wherein the sixth bottoms stream contains a majority of the ethane present in the at least a portion of the fifth bottoms stream.

59. The process of claim 57, wherein the olefin-containing effluent stream, the first overhead stream, the second overhead stream, the third overhead stream, and the fifth bottoms stream contain acetylene, the process further comprising the step of:

(g) contacting the acetylene in at least a portion of the fifth bottoms stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the acetylene to ethylene.

60. The process of claim 43, wherein the olefin-containing effluent stream contains from 50 to 95 combined weight percent ethylene and propylene, based on the total weight of the olefin-containing effluent stream.

61. The process of claim 43, wherein the olefin-containing effluent stream contains from 25 to 75 weight percent ethylene, based on the total weight of the olefin-containing effluent stream.

62. The process of claim 43, wherein the olefin-containing effluent stream contains from 25 to 75 weight percent propylene, based on the total weight of the olefin-containing effluent stream.

63. The process of claim 43, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further contain carbon dioxide, the process further comprising the step of:
(f) contacting the second overhead stream with a caustic medium under conditions effective to remove at least a majority of the carbon dioxide from the second overhead stream.

64. The process of claim 63, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further contain $C_4$+ hydrocarbons, the process further comprising the step of:
(g) separating at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

65. The process of claim 43, wherein the second overhead stream further contains water, the process further comprising the step of:
(f) contacting the second overhead stream with a drying medium in a drying unit under conditions effective to remove at least a majority of the

water from the second overhead stream.

66. The process of claim 43, wherein the olefin-containing effluent stream, the first overhead stream and the second overhead stream further contain $C_4$+ hydrocarbons, the process further comprising the step of:

(f) separating at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

67. The process of claim 43, wherein the process further comprises the step of:

(f) polymerizing the propylene from the fourth overhead stream.

68. A process for separating components from an olefin-containing effluent stream, the process comprising the steps of:

(a) contacting an oxygenate with a molecular sieve catalyst composition in a reactor under conditions effective to form the effluent stream, wherein the effluent stream contains water, ethane, ethylene, propane, propylene, dimethyl ether and one or more oxygenate byproducts, wherein the oxygenate byproducts are selected from the group consisting of methyl ethyl ether, ethanol, isopropanol, acetic acid, propionic acid, ethanal, butanal, propanal, acetone, 2-butanone, 2-pentanone, 4-methyl-2-pentanone and methyl acetate;

(b) cooling at least a portion of the effluent under conditions effective to form a quench overhead stream and a condensed stream, wherein the quench overhead stream comprises a majority of the ethane, ethylene, propane, propylene, dimethyl ether and the one or more oxygenate byproducts present in the effluent stream, and wherein the condensed stream contains a majority of the water present in the effluent stream;

(c) contacting the quench overhead stream with an oxygenate removal medium in an oxygenate removal unit under conditions effective to form a first overhead stream and a first bottoms stream, wherein the first overhead stream contains a majority of the ethane, ethylene, propane, propylene, and dimethyl ether present in the quench overhead stream and residual

oxygenate removal medium, and wherein the first bottoms stream contains a majority of the oxygenate removal medium, a majority of the oxygenate byproducts present in the quench overhead stream, and a minority of the dimethyl ether present in the quench overhead stream;

(d) contacting the first overhead stream with water under conditions effective to form a second overhead stream and a second bottoms stream, wherein the second overhead stream contains a majority of the ethane, ethylene, propane, propylene, and dimethyl ether present in the first overhead stream, and wherein the second bottoms stream contains a majority of the residual oxygenate removal medium present in the first overhead stream and a majority of the water contacted with the first overhead stream in step (d);

(e) separating at least a portion of the second overhead stream into a third overhead stream and a third bottoms stream, wherein the third overhead stream contains a majority of the ethane and ethylene present in the at least a portion of the second overhead stream, and wherein the third bottoms stream contains a majority of the propane, propylene and dimethyl ether present in the at least a portion of the second overhead stream; and

(f) separating at least a portion of the third bottoms stream into a fourth overhead stream and a fourth bottoms stream, wherein the fourth overhead stream contains a majority of the propylene present in the at least a portion of the third bottoms stream, and wherein the fourth bottoms stream contains a majority of the propane and dimethyl ether present in the at least a portion of the third bottoms stream.

69. The process of claim 68, wherein the oxygenate-removal medium is selected from the group consisting of methanol and tri(ethylene glycol).

70. The process of claim 68, wherein the second overhead stream contains greater than 1000 wppm dimethyl ether, based on the total weight of the second overhead stream.

71. The process of claim 70, wherein the second overhead stream contains greater than 1500 wppm dimethyl ether, based on the total weight of the second overhead stream.

72. The process of claim 68, wherein the process further comprises the step of:
    (g) separating at least a portion of the third overhead stream into a fifth overhead stream and a fifth bottoms stream, wherein the fifth overhead stream contains a majority of the ethylene present in the at least a portion of the third overhead stream, and wherein the fifth bottoms stream contains a majority of the ethane present in the at least a portion of the third overhead stream.

73. The process of claim 72, wherein the process further comprises the step of:
    (h) polymerizing the ethylene from the fifth overhead stream.

74. The process of claim 68, wherein the process further comprises the step of:
    (g) combusting at least a portion of the fourth bottoms stream as fuel.

75. The process of claim 68, wherein step (a) occurs at an oxygenate conversion of from about 80 to about 99 weight percent, based on the total weight of the oxygenate introduced into the reactor.

76. The process of claim 75, wherein step (a) occurs at an oxygenate conversion of from about 93 to about 96 weight percent, based on the total weight of the oxygenate introduced into the reactor.

77. The process of claim 68, wherein the fourth bottoms stream comprises at least 1 weight percent dimethyl ether, based on the total weight of the fourth bottoms stream.

78. The process of claim 77, wherein the fourth bottoms stream comprises at least 10 weight percent dimethyl ether, based on the total weight of the fourth bottoms stream.

79. The process of claim 68, wherein the olefin-containing effluent stream, the quench overhead stream, the first overhead stream, the second overhead stream, and the third overhead stream contain acetylene, the process further comprising the step of:

(g) contacting the acetylene in at least a portion of the third overhead stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the acetylene to ethylene.

80. The process of claim 68, wherein the olefin-containing effluent stream, the quench overhead stream, the first overhead stream, the second overhead stream, and the third bottoms stream contain methyl acetylene or propadiene, the process further comprising the step of:

(g) contacting the methyl acetylene or propadiene in at least a portion of the third bottoms stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the methyl acetylene or propadiene to propylene.

81. The process of claim 68, wherein the effluent stream, the quench overhead stream, the first overhead stream, the second overhead stream and the third overhead stream further contain methane, the process further comprising the step of:

(g) separating at least a portion of the third overhead stream into a fifth overhead stream and a fifth bottoms stream, wherein the fifth overhead stream contains a majority of the methane present in the at least a portion of the third overhead stream, and wherein the fifth bottoms stream contains a majority of the ethylene and ethane present in the at least a portion of the second overhead stream.

82. The process of claim 81, wherein the process further comprises the step of:

(h) separating at least a portion of the fifth bottoms stream into a sixth overhead stream and a sixth bottoms stream, wherein the sixth overhead stream contains a majority of the ethylene present in the at least a portion of the fifth bottoms stream, and wherein the sixth bottoms stream contains a majority of the ethane present in the at least a portion of the fifth bottoms stream.

83. The process of claim 81, wherein the olefin-containing effluent stream, the quench overhead stream, the first overhead stream, the second overhead stream, the third overhead stream, and the fifth bottoms stream contain acetylene, the process further comprising the step of:

(h) contacting the acetylene in at least a portion of the fifth bottoms stream with hydrogen and carbon monoxide under conditions effective to convert at least a portion of the acetylene to ethylene.

84. The process of claim 68, wherein the olefin-containing effluent stream contains from 50 to 95 combined weight percent ethylene and propylene, based on the total weight of the olefin-containing effluent stream.

85. The process of claim 84, wherein the olefin-containing effluent stream contains from 25 to 75 weight percent ethylene, based on the total weight of the olefin-containing effluent stream.

86. The process of claim 68, wherein the olefin-containing effluent stream contains from 25 to 75 weight percent propylene, based on the total weight of the olefin-containing effluent stream.

87. The process of claim 68, wherein the olefin-containing effluent stream, the quench overhead stream, the first overhead stream and the second overhead stream further contain carbon dioxide, the process further comprising the step of:

(g) contacting the second overhead stream with a caustic medium under conditions effective to remove at least a majority of the carbon dioxide from the second overhead stream.

88. The process of claim 87, wherein the olefin-containing effluent stream, the quench overhead stream, the first overhead stream and the second overhead stream further contain $C_4$+ hydrocarbons, the process further comprising the step of:

(h) separating at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

89. The process of claim 68, wherein the second overhead stream further contains water, the process further comprising the step of:

(g) contacting the second overhead stream with a drying medium in a drying unit under conditions effective to remove at least a majority of the water from the second overhead stream.

90. The process of claim 68, wherein the olefin-containing effluent stream, the quench overhead stream, the first overhead stream and the second overhead stream further contain $C_4$+ hydrocarbons, the process further comprising the step of:

(g) separating at least a majority of the $C_4$+ hydrocarbons from the second overhead stream.

91. The process of claim 68, wherein the process further comprises the step of:

(g) polymerizing the propylene from the fourth overhead stream.